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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/087,210	03/04/2002	Shinichi Nishizawa	75120-030-2	6903
25269	7590	05/09/2006	EXAMINER	
DYKEMA GOSSETT PLLC FRANKLIN SQUARE, THIRD FLOOR WEST 1300 I STREET, NW WASHINGTON, DC 20005				GUILL, RUSSELL L
ART UNIT		PAPER NUMBER		
				2123

DATE MAILED: 05/09/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/087,210	NISHIZAWA ET AL.	
	Examiner Russ Guill	Art Unit 2123	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) Responsive to communication(s) filed on 07 February 2006.
- 2a) This action is FINAL. 2b) This action is non-final.
- 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) Claim(s) 1-22 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) Claim(s) _____ is/are allowed.
- 6) Claim(s) 1-22 is/are rejected.
- 7) Claim(s) 4,10,12 and 14 is/are objected to.
- 8) Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) The specification is objected to by the Examiner.
- 10) The drawing(s) filed on 07 February 2006 is/are: a) accepted or b) objected to by the Examiner.
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 - a) All b) Some * c) None of:
 1. Certified copies of the priority documents have been received.
 2. Certified copies of the priority documents have been received in Application No. _____.
 3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____. |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____. | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| | 6) <input type="checkbox"/> Other: _____. |

DETAILED ACTION

1. This Office Action is in response to an Amendment filed February 7, 2006. Claims 16 and 18 were amended. Claim 23 was canceled. Claims 1 – 22 are pending. Claims 1 – 22 have been examined. Claims 1 – 22 have been rejected.
2. **The Examiner would like to thank the Applicant for the well-presented response, which was useful in the examination process.**

Response to Remarks

3. As an initial matter, the Examiner would like to note that new claim rejections have been made under 35 USC § 101 and 35 USC § 112, second paragraph.
4. Regarding the objection to the drawings, the new corrected drawings overcome the objection.
5. Regarding the objection to the specification, the side force 26 does not appear to be shown in either figure 2 or figure 7 as recited in the response. Accordingly, the rejection is maintained.
6. Regarding claims **1, 4, 12, 14 and 23** rejected under 35 USC § 112, first paragraph:
 - a. Applicants' arguments and amendments have been fully considered and are persuasive. Accordingly, the rejections are withdrawn.
7. Regarding claims **16 and 18** rejected under 35 USC § 112, second paragraph:
 - a. Applicants' arguments and amendments have been fully considered but are not persuasive. In addition to the discussion provided in the rejection, the Examiner notes that since the trademark names ADAMS and

MARC are recited, new features could be provided in the recited software that would be covered by the claim, even though the features did not exist at the time of invention. Accordingly, the rejections are maintained.

8. Regarding claim 1, rejected under 35 USC § 103:

- a. Applicants' arguments have been fully considered but they are not persuasive. Accordingly, the rejection is maintained. The Examiner's response follows.
- b. The Applicant argues (page 8, second paragraph, and page 11, fifth paragraph) that *Kumagai, Turner* and *Ziegert*, viewed either singly or in combination, do not teach or fairly suggest a method for modeling a coil spring on a suspension in terms of derived torque and force characteristics of the spring, the method including the steps of, "providing a force field generator for simulating the spring; securing the force field generator to the suspension system; activating the force field generator to produce forces for characterizing the spring; measuring the forces; measuring the torques; and deriving a spring design based upon the measured forces and torques," as recited in independent claim 1.
 - i. The Examiner respectfully replies: Applicant's arguments fail to comply with 37 CFR 1.111(b) because they amount to a general allegation that the claims define a patentable invention without specifically pointing out how the language of the claims patentably distinguishes them from the references.
- c. The Applicant argues (page 9, fourth paragraph) that Kumagai does not disclose utilizing a force field generator to mimic spring characteristics by actually installing the generator into an automobile suspension system for testing purposes.

- i. The Examiner respectfully replies: *Kumagai*, figure 3b, shows a force field generator installed into an automobile suspension system. Further, *Kumagai* recites, in the Abstract, "If an actual parallel mechanism is available and inserted into an experimental suspension system in place of a coil spring, it can be used as a device to generate various forces and torques between the upper and lower spring seats to study desirable characteristics useful for designing coil springs." Therefore, *Kumagai* appears to disclose utilizing a force field generator to mimic spring characteristics by actually installing the generator into an automobile suspension system for testing purposes.
 - d. The Applicant argues, (page 11, fourth paragraph), with regard to the teachings of *Turner* and *Ziegert*, Applicant respectfully asserts that *Turner* and *Ziegert* fail to overcome the aforementioned deficiencies cited in the teachings of *Kumagai*.
 - i. The Examiner respectfully replies: Applicant's arguments fail to comply with 37 CFR 1.111(b) because they amount to a general allegation that the claims define a patentable invention without specifically pointing out how the language of the claims patentably distinguishes them from the references.
9. Regarding **claim 4**, rejected under 35 USC § 103:
- a. Applicants' arguments have been fully considered but they are not persuasive. Accordingly, the rejection is maintained. The Examiner's response follows.
 - b. The Applicant argues (page 12, third paragraph) that *Kumagai*, *Turner* and *Ziegert*, viewed either singly or in combination, do not teach or fairly suggest a method for modeling a coil spring in terms of torque and force characteristics to produce a spring design for an automobile suspension,

including the steps of, “assembling a mechanism having spaced apart moveable platforms and a plurality of actuatable links interconnecting the platforms at corresponding joints on opposite ends of each link; specifying a kinematics relationship between the platforms and the links; applying the mechanism to the suspension system; actuating the links to generate corresponding applied forces and torques at each joint; measuring the applied forces and torques; and deriving the force and torque characteristic of the spring to be designed based upon the kinematics and the corresponding applied forces and torques at each joint,” as recited in independent claim 4.

i. The Examiner respectfully replies: Applicant's arguments fail to comply with 37 CFR 1.111(b) because they amount to a general allegation that the claims define a patentable invention without specifically pointing out how the language of the claims patentably distinguishes them from the references.

10. Regarding **claim 19**, rejected under 35 USC § 103:

- a. Applicants' arguments have been fully considered but they are not persuasive. Accordingly, the rejection is maintained. The Examiner's response follows.
- b. The Applicant argues (page 12, last paragraph) that *Kumagai, Turner* and *Ziegert*, viewed either singly or in combination, do not teach or fairly suggest an apparatus for modeling a coil spring on a suspension system in terms of derived torque and force characteristics of the spring including, “a force field generator for simulating the spring, said force field generator secured in the suspension system, and means for activating the force field generator to produce forces therein for characterizing the spring,” as recited in independent claim 19.

i. The Examiner respectfully replies: Applicant's arguments fail to comply with 37 CFR 1.111(b) because they amount to a general allegation that the claims define a patentable invention without specifically pointing out how the language of the claims patentably distinguishes them from the references.

Specification

11. The disclosure is objected to because on page 8, paragraph 37, the side force 26 is not displayed in either figure 2 or figure 7. Appropriate correction is required.

Claim Objections

12. **Claim 4** is objected to because of the following informalities: The claim recites in line 8, "the suspension system." Reference to the previous limitation should remain consistent to avoid any possible confusion or antecedent issues. The antecedent appears to be an "automobile suspension." Appropriate correction is required.

13. **Claim 4** is objected to because of the following informalities: The claim recites in line 13, "the kinematics." Reference to the previous limitation should remain consistent to avoid any possible confusion or antecedent issues. The antecedent appears to be a "kinematics relationship." Appropriate correction is required.

14. **Claim 10** is objected to because of the following informalities: The claim recites in line 3, "the other one of said platforms." The parent claim does not appear to be limited to two platforms. Reference to the previous limitation should remain consistent to avoid any possible confusion or antecedent issues. For the purpose of claim examination, the phrase, "the other one of said

platforms" is interpreted as "an other one of said platforms." Appropriate correction is required.

15. **Claim 12** is objected to because of the following informalities: The claim recites in line 2, "derived force and torque characteristics." The parent claim refers to a single derived force and torque characteristic. Reference to the previous limitation should remain consistent to avoid any possible confusion or antecedent issues. Appropriate correction is required.

16. **Claim 14** is objected to because of the following informalities: The claim recites in lines 2 - 3, "computing the force and torque characteristics." The parent claim refers to a single force and torque characteristic. Reference to the previous limitation should remain consistent to avoid any possible confusion or antecedent issues. Appropriate correction is required.

Claim Rejections - 35 USC § 112

17. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

a. **Claims 1 – 3, 5 and 14 - 18** are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

i. Regarding **claim 1**, the claim recites in line 7, "the torques". The phrase has insufficient antecedent basis. The torque that is mentioned in the preamble is singular, and is a derived torque, so that it does not appear to be the same torque that is measured. For

the purpose of claim examination, the phrase, "the torques" is interpreted as "torques". Correction or amendment is required.

ii. Regarding **claim 5**, the claim recites in line 1, "the assembly". The phrase has insufficient antecedent basis. For the purpose of claim examination, the phrase, "the assembly" is interpreted as "the mechanism". Correction or amendment is required.

iii. Regarding **claim 14**, the claim recites in line 3, "the platform is compressed". The phrase has insufficient antecedent basis. For the purpose of claim examination, the phrase, "the platform is compressed" is interpreted as "the platforms are compressed". Correction or amendment is required.

iv. Regarding **claim 15**, the claim recites in lines 1 - 2, "the force and torque vectors". The phrase has insufficient antecedent basis. For the purpose of claim examination, the phrase, "the force and torque vectors" is interpreted as "force and torque vectors". Correction or amendment is required.

v. Regarding **claim 16**, the claim recites in lines 1 - 2, "the method of claim 13, wherein computing the force and torque vectors". The phrase has insufficient antecedent basis. For the purpose of claim examination, the phrase is interpreted as "the method of claim **15**, wherein computing the force and torque vectors". Correction or amendment is required.

vi. **Claim 16** is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 16 contains the trademark/trade name MARC. Where a

trademark or trade name is used in a claim as a limitation to identify or describe a particular material or product, the claim does not comply with the requirements of 35 U.S.C. 112, second paragraph. See *Ex parte Simpson*, 218 USPQ 1020 (Bd. App. 1982). The claim scope is uncertain since the trademark or trade name cannot be used properly to identify any particular material or product. A trademark or trade name is used to identify a source of goods, and not the goods themselves. Thus, a trademark or trade name does not identify or describe the goods associated with the trademark or trade name. In the present case, the trademark/trade name is used to identify/describe MARC and, accordingly, the identification/description is indefinite. Correction or amendment is required.

vii. **Claim 18** is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Claim 18 contains the trademark/trade name ADAMS. Where a trademark or trade name is used in a claim as a limitation to identify or describe a particular material or product, the claim does not comply with the requirements of 35 U.S.C. 112, second paragraph. See *Ex parte Simpson*, 218 USPQ 1020 (Bd. App. 1982). The claim scope is uncertain since the trademark or trade name cannot be used properly to identify any particular material or product. A trademark or trade name is used to identify a source of goods, and not the goods themselves. Thus, a trademark or trade name does not identify or describe the goods associated with the trademark or trade name. In the present case, the trademark/trade name is used to identify/describe ADAMS and, accordingly, the

identification/description is indefinite. Correction or amendment is required.

viii. **Claims 2 - 3 and 17** are rejected based on their dependency on their respective intermediate and parent claims which are rejected under 35 U.S.C. 112, second paragraph.

Claim Rejections - 35 USC § 101

18. 35 U.S.C. 101 reads as follows:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

19. **Claims 1 - 18** are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter.

a. Regarding claims 1 - 18, the claims do not appear to produce a useful and tangible result to form the basis of a practical application needed to be statutory.

Claim Rejections - 35 USC § 102

20. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless -

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent

21. **Claims 19 and 20** are rejected under 35 U.S.C. 102(b) as being anticipated by Kumagai (Kumagai, Akihiko; Nishizawa, Shinichi; Ikeda, Maiko; Sugiyama Toru Tom; Enomoto, Hideto; Sato, Naoshi; Hamano, Toshio; "Modeling of Coil Springs Using Parallel Mechanisms", 2000, art provided by Applicant on the form PTO-1449 Information Disclosure Statement).

a. **Regarding claim 19**, Kumagai appears to teach:

- i. An apparatus for modeling a coil spring on a suspension system in terms of derived torque and force characteristics of the spring (**page 1, Abstract, lines 5 – 22; and page 3, figures 3(a) and 3(b); and page 3, right-side column, lines 1 - 20**) comprising:
 - ii. a force field generator for simulating the spring, said force field generator secured in the suspension system (**page 1, Abstract, lines 5 – 22; and page 3, figures 3(a) and 3(b)**), and
 - iii. means for activating the force field generator to produce forces therein for characterizing the spring (**page 1, Abstract, lines 5 – 22; and page 3, figures 3(a) and 3(b)**; note that in order for the force field generator to be inserted into a suspension in place of a spring and generate various forces, it is inherent that there is a means for activating).

b. **Regarding claim 20**, Kumagai appears to teach:

- i. The apparatus of claim 19, wherein the force field generator comprises:
 - ii. a damper including a housing and a telescopic strut, the strut being axially movable between respective fully extended and fully compressed positions (**page 3, figure 3(b), and page 3, section "Suspension model in ADAMS"**);

- iii. a first support secured to the housing and second support secured to the strut for relative movement in the extended and compressed positions (**page 3, figure 3(b), and page 3, section "Suspension model in ADAMS"**);
- iv. a plurality of hydraulic cylinders secured between the first and second supports, said hydraulic cylinders being actuatable for exerting a force between the first and second supports (**page 3, figures 3(a) and 3(b), and page 3, section "Suspension model in ADAMS"; and page 1, Abstract**).

Claim Rejections - 35 USC § 103

22. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

23. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

24. **Claims 1 – 6, 8 - 18 and 21 – 23** are rejected under 35 U.S.C. 103(a) as being unpatentable over Kumagai (Kumagai, Akihiko; Nishizawa, Shinichi; Ikeda, Maiko; Sugiyama Toru Tom; Enomoto, Hideto; Sato, Naoshi; Hamano, Toshio; “Modeling of Coil Springs Using Parallel Mechanisms”, 2000, art provided by Applicant on the form PTO-1449), in view of Turner (Turner, John; Hill, Martyn; “Instrumentation for Engineers and Scientists”, 1999, Oxford University Press).

a. **Regarding claim 1**, Kumagai appears to teach:

- i. providing a force field generator for simulating a spring (page 3, Figure 3(b); and page 1, Abstract);
- ii. securing the force field generator to the suspension system (page 3, Figure 3(b); and page 1, Abstract);
- iii. activating the force field generator to produce forces for characterizing the spring (page 3, Figure 3(b); and Abstract; and page 1, section Introduction, right-side column, third paragraph);
- iv. deriving a spring design based upon the measured forces and measured torques (Abstract, lines 13 - 21);

b. **Regarding claim 1**, Kumagai does not specifically teach:

- i. measuring the forces;
- ii. measuring the torques;

c. **Regarding claim 1**, Turner appears to teach:

- i. measuring forces (page 76, first paragraph, and figures 5.3 and 5.4);
- ii. measuring torques (page 110, section 7.1; and pages 115 – 116, section 7.3 and figure 7.6);

d. The motivation to use the art of Turner with the art of Kumagai would have been the suggestion in Kumagai that forces and torques between the upper and lower spring seats used to study desirable characteristics for designing coil springs (Abstract, lines 13 - 21). As further motivation,

Kumagai notes that in quasi-static force-torque analysis, force and torque characteristics are observed after a kinematics relationship is given (page 1, section Introduction, right-side column, paragraph 2).

e. Therefore, as discussed above, it would have been obvious to the ordinary artisan at the time of invention to use the art of Turner with the art of Kumagai to produce the claimed invention.

f. Regarding claim 2, Kumagai appears to teach:

i. the force field generator has six degrees of freedom

(Abstract; and page 1, section Introduction, right-side column, first paragraph).

g. Regarding claim 3, Kumagai appears to teach:

i. the force field generator comprises a Stewart platform (page 3, figures 3(a) and 3(b)).

h. Regarding claim 4, Kumagai appears to teach:

i. assembling a mechanism having spaced apart moveable platforms and a plurality of actuatable links interconnecting the platforms at corresponding joints on opposite ends of each link (page 3, figures 3(a) and 3(b); and page 1, Abstract; and page 1, section Introduction, right-side column);

ii. specifying a kinematics relationship between the platforms and the links (page 1, section Introduction, right-side column, second and third paragraphs);

iii. applying the mechanism to the suspension system (page 1, Abstract; and page 3, figures 3(a) and 3(b));

iv. actuating the links to generate corresponding applied forces and torques at each joint (page 3, Figure 3(b); and page 1, Abstract; and page 1, section Introduction, right-side column, third paragraph);

- v. deriving the force and torque characteristic of the spring to be designed based upon the kinematics and the corresponding applied forces and torques at each joint.
- i. **Regarding claim 4**, Kumagai does not specifically teach:
 - i. measuring the applied forces and torques;
- j. **Regarding claim 4**, Turner appears to teach:
 - i. measuring applied forces (**page 76, first paragraph, and figures 5.3 and 5.4**);
 - ii. measuring applied torques (**page 110, section 7.1; and pages 115 – 116, section 7.3 and figure 7.6**);
- k. The motivation to use the art of Turner with the art of Kumagai would have been the suggestion in Kumagai that forces and torques between the upper and lower spring seats can be used to study desirable characteristics for designing coil springs (**page 1, Abstract, lines 13 - 21**). As further motivation, Kumagai notes that in quasi-static force-torque analysis, force and torque characteristics are observed after a kinematics relationship is given (**page 1, section Introduction, right-side column, paragraph 2**).
- l. Therefore, as discussed above, it would have been obvious to the ordinary artisan at the time of invention to use the art of Turner with the art of Kumagai to produce the claimed invention.
- m. **Regarding claim 5**, Kumagai appears to teach:
 - i. the assembly has six degrees of freedom (**Abstract; and page 1, section Introduction, right-side column, first paragraph**).
- n. **Regarding claim 6**, Kumagai appears to teach:
 - i. the platforms are in spaced apart parallel relationship having confronting parallel support surfaces corresponding to opposite ends of the spring to be modeled (**page 3, figures 3(a) and**

3(b); and page 1, Abstract; and page 1, section Introduction, right-side column).

- o. Regarding claim 8, Kumagai teaches:**
 - i. the actuatable links employ at least one ball joint (**page 2, section Model Description of Parallel Mechanism, first paragraph, spherical joints; and page 2, figure 1, joints labeled S**).
- p. Regarding claim 9, Kumagai appears to teach:**
 - i. specifying a kinematics relationship between the platforms and the links comprises deriving a vectorial relationship between each link and the platforms (**page 2, section Model Description of Parallel Mechanism; and page 2, figure 2**).
- q. Regarding claim 10, Kumagai appears to teach:**
 - i. establishing the vectorial relationships includes deriving force and torque vectors acting on the mechanism by one of said platforms with respect to the other one of said platforms (**pages 2 - 3, section Model Description of Parallel Mechanism, especially the portion on page 3**).
- r. Regarding claim 11, Kumagai appears to teach:**
 - i. adjusting the forces applied to each actuatable link (**page 1, right-side column, third paragraph**).
- s. Regarding claim 12, Kumagai appears to teach:**
 - i. Designing the spring in accordance with the derived force and torque characteristics (**page 1, Abstract, lines 13 - 21**).
- t. Regarding claim 13, Kumagai appears to teach:**
 - i. the coil spring has a variable pitch and the step of designing the spring comprises selecting a pitch for the spring for producing a resulting side force in the spring (**page 3, right-side column, first paragraph, and list item 1**).

- u. Regarding claim 14, Kumagai appears to teach:
 - i. the platforms are movable between rest and compressed positions and the deriving step includes the step of computing the force and torque characteristics while the platform is compressed (page 3, figure 3(a); page 3, right-side column, first paragraph, list item 2, "Computaton of the six . . .").
- v. Regarding claim 15, Kumagai appears to teach:
 - i. The method of claim 14, comprising the step of: computing the force and torque vectors employing FEM software. (page 3, figure 3(a); page 3, right-side column, first paragraph, list item 2, "Computation of the six . . ."; and page 3, left-side column, line 1 through "Suspension model in Adams").
- w. Regarding claim 16, Kumagai appears to teach:
 - i. The method of claim 13, wherein computing the force and torque vectors comprises the step of employing MARC software for computing the force and torque vectors (page 3, right-side column, first paragraph, list item 2, "Computation of the six . . ."; and page 3, left-side column, line 1 through "Suspension model in Adams").
- x. Regarding claim 17, Kumagai appears to teach:
 - i. The method of claim 16, comprising the step of converting the computed force and torque vectors for each link into axial forces employing a cubic spline interpolation (page 3, right-side column, first paragraph, list item 3, "Conversion of the . . ."; and page 3, left-side column, line 1 through "Suspension model in Adams").
- y. Regarding claim 18, Kumagai appears to teach:

- i. The method of claim 4, further comprising simulating the system in ADAMS simulation software (**page 3, right-side column, first paragraph, list item 4, "Simulation in ADAMS "**).
- z. **Regarding claim 21**, Kumagai does not specifically teach:
 - i. The apparatus of claim 20, wherein the force generator further comprises: a force sensor for each hydraulic cylinder for producing an output corresponding to the force produced by each respective cylinder when actuated.
- aa. **Regarding claim 21**, Turner appears to teach:
 - i. measuring forces (**page 76, first paragraph, and figures 5.3 and 5.4**);
- bb. **Regarding claim 21**, The motivation to use the art of Turner with the art of Kumagai would have been the suggestion in Kumagai that forces and torques between the upper and lower spring seats used to study desirable characteristics for designing coil springs (**Abstract, lines 13 - 21**). As further motivation, Kumagai notes that in quasi-static force-torque analysis, force and torque characteristics are observed after a kinematics relationship is given (**page 1, section Introduction, right-side column, paragraph 2**). Therefore, as discussed above, it would have been obvious to the ordinary artisan at the time of invention to use the art of Turner with the art of Kumagai to produce the claimed invention.
- cc. **Regarding claim 22**, Kumagai appears to teach:
 - i. a hydraulic circuit for selectively actuating each of the hydraulic cylinders and producing a selectable force therein (**page 1, right-side column, third paragraph; and page 3, figures 3(a) and 3(b)**);

- ii. control means for controlling the hydraulic circuit (**page 1, right-side column, third paragraph; and page 3, figures 3(a) and 3(b)**); and
- iii. means responsive to the force sensors in feedback relation with the control means for controlling the forces produced in the cylinders (**page 1, right-side column, third paragraph; and page 3, figures 3(a) and 3(b)**).

25. **Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kumagai in view of Turner as applied to claims 1 – 6 above, and further in view of Ziegert (U.S. Patent 5,797,191).**

- a. **Regarding claim 7, Kumagai as modified by Turner teaches the method for modeling a coil spring in terms of torque and force characteristics to produce a spring design for an automobile suspension as recited in claims 1 – 6, above.**
- b. **Regarding claim 7, Ziegert teaches:**
 - i. the actuatable links employ at least one universal joint (**column 5, lines 55 – 60**).
- c. The motivation to use the art of Ziegert with the art of Kumagai and Turner would have been the benefit cited in Ziegert that the universal joint helps assures true spherical motion during operation (**column 5, lines 55 – 60**).
- d. Therefore, as discussed above, it would have been obvious to the ordinary artisan at the time of invention to use the art of Ziegert with the art of Kumagai and Turner to produce the claimed invention.

26. **Examiner's Note:** Examiner has cited particular columns and line numbers in the references applied to the claims above for the convenience of the applicant. Although the specified citations are representative of the teachings of the art and are applied to specific limitations within the individual claim, other passages and figures may apply as well. It is respectfully requested from the applicant in preparing responses, to fully consider the references in their entirety as potentially teaching all or part of the claimed invention, as well as the context of the passage as taught by the prior art or disclosed by the Examiner.

Conclusion

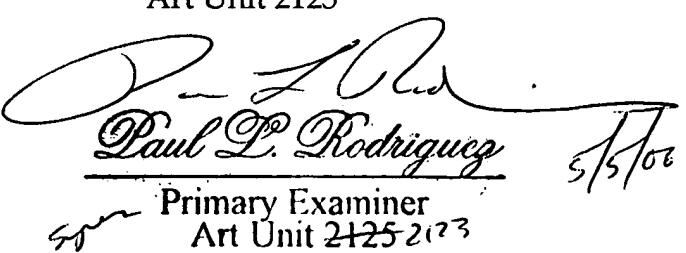
Any inquiry concerning this communication or earlier communications from the examiner should be directed to Russell L. Guill whose telephone number is 571-272-7955. The examiner can normally be reached on Monday - Friday 9:30 AM - 6:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Paul Rodriguez can be reached on 571-272-3753. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300. Any inquiry of a general nature or relating to the status of this application should be directed to the TC2100 Group Receptionist: 571-272-2100.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Russ Guill
Examiner
Art Unit 2123

RG


Paul L. Rodriguez S. P.
Primary Examiner
Art Unit 2123